

performing operations upon the subframes in any of the modules sourcing data to the restructuring module;

after completion of the operations for all of the subframes sourcing data to the restructuring module, issuing a control transaction to the restructuring module; and

performing operations upon the subframes sourced to the restructuring module in response to the control transaction.

REMARKS

Claims 1-8 and 10-81 are currently pending in the present application. Claims 1, 11, 21, 33, 43, 57, 69, 80 and 81 are independent claims while dependent claims account for the remaining claims. In this amendment, all of the independent claims have been amended and several of the dependent claims have been amended as well. Favorable reconsideration of the application is requested in view of these foregoing amendments and the following remarks.

The Office Action dated October 3, 2002 has been carefully considered. In summary, the Office action rejected claims 2, 6, 7, 9, 12, 19, 22, and 44 under 35 U.S.C. § 112 for failure to distinctly claim the subject matter of the invention. Claims 43-56 were rejected under 35 U.S.C. § 101 as inoperative and lacking utility. Claims 1-3, 10, 21, 23-25, 27, 57-63, 67, 68 and 80 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bernstein, U.S. Patent No. 5,282,202, in view of Scott, U.S. Patent No. 5,079,770. Claims 4 and 5 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bernstein, Scott and Chih, U.S. Patent No. 6,334,175. Claims 6 and 7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bernstein, Scott, Chih and Khalidi, U.S. Patent No. 6,405,237. Claims 8, 9, 11, 12, 15-18, 26, 28, 30-38, 56, 64-66, 69-77 and 81 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bernstein, Scott and Deleeuw, U.S. Patent No. 6,353,450. Claims 13, 14, 39 and 40 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bernstein, Scott, Deleeuw and Wilson, U.S. Patent No. 4,841,526. Claims 19, 20, 41 and 42 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bernstein, Scott, Deleeuw and Miller, U.S. Patent No.

6,212,450. Finally, claim 29 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Bernstein, Scott, Chih and Deleeuw.

The Applicants would like to thank Examiner Hunt for the courtesy of a telephone interview on January 6th, 2003. The Examiner's Interview Summary sent to the applicants on January 8th, 2003 outlines the conversation. During this discussion, the examiner reviewed a proposed amendment of claim 1, which has been incorporated into this formal response, and came to the conclusion that the proposed amendment overcomes the rejection of record in the Office action. The examiner and applicants' representatives John Conklin and Jason Evans also discussed the 35 U.S.C. § 101 rejection of claims 43-56. Applicants agreed to enter amendments to these claims, which amendments would then be subject to review by the PTO's internal 101 panel.

In addition to the amendment to claim 1 set forth herein in keeping with the proposal discussed during the interview, independent claims 11, 21, 33, 57, 69, 80 and 81 of the claim set have also been amended in keeping with the theme of the amendment to claim 1, which more clearly defines the environment of the invention. Dependent claims 2- 4, 6, 7, 12-14, 19, 22, 34, 41, 58-59, 68, 77 and 78 have been amended to correct antecedent bases and to make the claim language clearer. The remaining independent claim 43 has been amended to more clearly define its storage medium in order to overcome the Section 101 rejection.

Because the rejected dependent claims are patentable for at least the same reasons given for the independent claims, the following remarks are aimed primarily at the features of the independent claims.

Claim 1 As Amended

Claim 1 has been amended to further define the claimed "pipe," which is generated by dividing a "graph" constructed "as a sequence of the modules for accepting and processing the frames of streaming data to achieve desired output data." Nothing in Bernstein or Scott teaches or suggests the construction of a graph as a particular sequence of modules chosen to achieve particular data. Nor does this prior art teach or suggest a pipe constructed as a division of this

graph, chosen according to performance parameters. In Bernstein, a composite frame is configured and sent along a network path to a client machine. Thus, as stated in the Office action, Bernstein does not teach constructing a pipe as a connected group of multiple ones of the modules. In Scott, an apparatus is shown for the transmission of a data source over a high-speed serial media to a receiver where it is reconfigured. Thus, while Scott does show a number of modules, Scott does not teach the construction of a graph as a connected group of these modules and its further division into pipes. As agreed upon with the Examiner, claim 1, as amended, overcomes the rejection under 35 U.S.C. § 103(a).

The other references cited in the Office action are also inapposite to amended claim 1. Chih is directed to a memory allocation system and method, allowing multiple applications to share a memory bank efficiently. Chih does not teach constructing a graph of a sequence of modules that accepts streaming data. As applied in the Office action, Khalidi is directed to a method permitting a module to allocate memory for an application. Khalidi similarly does not teach the construction of a graph. Wilson is directed to a data communication system, whereby the user can select appropriate parameters with respect to the communications link, which neither teaches nor suggests the construction of a graph. Miller is directed to a data management system that distributes data among local and remote data sources. Miller also neither teaches nor suggests the construction of a graph of modules.

Finally, Deleeuw is directed to placing a transparent user interface element on a display, such that a scene is rendered simultaneously with other display elements. As highlighted by the Office action, Deleeuw teaches the instantiation of a filter graph used to structure the filters through which a video data signal will flow. Deleeuw does not teach the dividing the graph into one or more pipes, which further facilitates the organization of a flow of streaming data through a sequence of modules. Deleeuw also does not teach a graph or pipe containing one or more restructuring modules, which modules are recited in claim 1. Furthermore, the prior art is devoid of any motivation for a combination of Bernstein, Scott and Deleeuw that yields the claimed invention, assuming there is such a combination. None of Bernstein, Scott or Deleeuw suggests the

incorporation of restructuring modules into a pipe or graph dedicated to processing streaming data as claimed.

The Other Independent Claims 11, 21, 33, 57, 69, 80 and 81

Independent claims 11, 21, 33, 57, 69, 80 and 81 have been amended similarly to claim 1, to more clearly define the environment of the invention. Therefore, for the same reasons given above with respect to claim 1, these independent claims also overcome their rejections under 35 U.S.C. § 103(a).

The Dependent Claims

The claims dependent upon the independent claims are allowable for at least the same reasons discussed above. The amendments to the dependent claims 2- 4, 6, 7, 12-14, 19, 22, 34, 41, 58-59, 68, 77 and 78 are not meant to change the scope of the claims, but to make them more easily understood, and to correctly match antecedent bases in the amended independent claims.

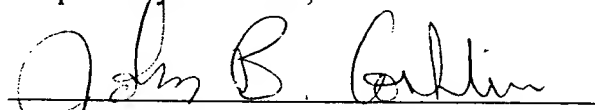
The Section 101 Rejection

The remaining Independent claim 43 has been amended to recite a “computer-readable medium having stored thereon a data structure.” This amendment overcomes the Section 101 rejection, by locating a functional structure on a specified storage medium - MPEP § 2106 IV. B. 1 (a) at page 2100-13.

CONCLUSION

The application is considered in good and proper form for allowance, and the examiner is respectfully requested to pass this application to issue. If, in the opinion of the examiner, a telephone conference would expedite the prosecution of the subject application, the examiner is invited to call the undersigned attorney.

Respectfully submitted,

A handwritten signature in dark ink, appearing to read "John B. Conklin", is written over a horizontal line.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Lisitsa et al.

Group Art Unit: 2152

Serial No. 09/310,596

Examiner: Eric T. Hunt

Filed: May 12, 1999

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For: EFFICIENT SPLITTING AND MIXING OF STREAMING-DATA FRAMES FOR
PROCESSING THROUGH MULTIPLE PROCESSING MODULES

AMENDMENTS TO CLAIMS
MADE IN RESPONSE TO OFFICE ACTION DATED OCTOBER 3, 2002

1. (Amended) A method for processing frames of streaming data through modules in a digital computer, comprising:
constructing a graph as a sequence of the modules for accepting and processing the frames of streaming data to achieve desired output data;
dividing the graph to define a pipe according to performance parameters for each of the modules and the graph as a whole, wherein the pipe is [constructing a pipe as] a connected group of multiple ones of the modules, at least one of the modules being a restructuring module;
providing a common memory area accessible to the modules within the pipe for storing streaming data;
allocating composite frames in the common memory area, each composite frame having predefined subframes;
transporting the streaming data through different ones of the modules in the group in different ones of the subframes; and
restructuring the data among at least some of the subframes in the restructuring module.
2. (Amended) A computer-readable medium [bearing instructions and data for causing a digital computer to execute]having computer executable instructions for a digital computer to perform steps comprising the method of claim 1.

3. (Amended) The method of claim 1 where the composite frame is a physical frame in [a]the common memory area.
4. (Amended) The method of claim 3, where the subframes are virtual frames defined in the [same]common memory area[as the physical frame].
6. (Amended) The method of claim 5 where the allocator is assigned to [the]a farthest upstream restructuring module in the pipe.
7. (Amended) The method of claim 5 where the allocator is assigned to [the]a farthest downstream restructuring module in the pipe.
9. Canceled.
11. (Amended) A method for processing frames of streaming data through multiple modules disposed in a pipe[including at least one restructuring module] in a digital computer, comprising:
 - constructing a graph as a sequence of the modules for accepting and processing the frames of streaming data to achieve desired output data;
 - dividing the graph to define the pipe according to performance parameters for each of the modules and the graph as a whole, wherein the pipe is a connected group of multiple ones of the modules, at least one of the modules being a restructuring module;
 - allocating a composite frame having multiple subframes;
 - performing operations upon the subframes in any of the modules sourcing data to the restructuring module;
 - after completion of the operations for all of the subframes sourcing data to the restructuring module, issuing a control transaction to the restructuring module; and
 - performing operations upon the subframes sourced to the restructuring module in response to the control transaction.
12. (Amended) A computer readable medium [bearing instructions and data for causing a digital computer to execute]having computer executable instructions for a digital computer to perform steps comprising the method of claim 11.
13. (Amended) The method of claim 11 where allocating the composite frame includes constructing a frame control table having an entry for each module in the pipe and a flag for each

of the modules indicating whether a particular module has completed an operation upon the subframe.

14. (Amended) The method of claim 13 further comprising setting one of the flags whenever a module has completed an operation upon a subframe.

19. (Amended) The method of claim 11, wherein the pipe accommodates performance of operations upon a plurality of composite frames concurrently[further comprising repeating the above steps overlapped in time such that a plurality of composite frames circulate within the pipe concurrently].

21. (Amended) A method for processing frames of streaming data through modules including multiple restructuring modules in a digital computer, comprising:

constructing a graph as a sequence of the modules for accepting and processing the frames of streaming data to achieve desired output data;

dividing the graph to define a pipe according to performance parameters for each of the modules and the graph as a whole, wherein each pipe is a connected group of multiple ones of the modules including the restructuring modules;

[constructing a pipe as a connected group of the modules including the restructuring modules;]

assigning a single allocator to one of the modules;

allocating composite frames having predefined subframes associated with respective ones of the restructuring modules;

transporting the streaming data through different ones of the modules in the group in different ones of the subframes; and

restructuring the data among the subframes in the restructuring modules.

22. (Amended) A computer readable medium [bearing instructions and data for causing a digital computer to execute]having computer executable instructions for a digital computer to perform steps comprising the method of claim 21.

33. (Amended) A method for processing frames of streaming data through modules including multiple restructuring modules connected in a pipe in a digital computer, comprising:

constructing a graph as a sequence of the modules for accepting and processing the frames of streaming data to achieve desired output data;

dividing the graph to define the pipe according to performance parameters for each of the modules and the graph as a whole, wherein the pipe is a connected group of multiple ones of the modules;

allocating a composite frame having multiple subframes for different ones of the restructuring modules;

performing data-sourcing operations upon certain of the subframes in source ones of the modules;

when each of the data-sourcing operations has completed, determining whether one of the restructuring modules has all of the subframes required for it to perform an operation;

if so, issuing a control transaction to the one restructuring module; and

performing an operation in the one restructuring module[s] after receiving a control transaction.

34. (Amended) A computer readable medium [bearing instruction and data for causing a digital computer to execute]having computer executable instructions for a digital computer to perform steps comprising the method of claim 33.

39. (Amended) The method of claim 33 further comprising:

storing a separate completion flag for each of the modules in the pipe; and

setting one of the completion flags when a corresponding one of the modules has completed an operation upon [the]a subframe.

41. (Amended) The method of claim 33, wherein the pipe accommodates performance of operations upon a plurality of composite frames concurrently[further comprising repeating the above steps overlapped in time such that a plurality of composite frames circulate within the pipe concurrently].

43. (Amended) A computer-readable medium having stored thereon a data structure for processing modules in a graph, comprising:

a single composite frame physically allocated in a memory; and

a plurality of virtual subframes allocated within the composite frame.

57. (Amended) A computer system for processing streaming data, comprising:

a plurality of modules for processing the streaming data, at least some of which are restructuring;

a plurality of memory managers for allocating composite frames containing subframes for containing streaming data; and

a flow manager for constructing a graph as a sequence of the modules for accepting and processing the streaming data to achieve desired output data, for dividing the graph to define a [having at least one] pipe according to performance parameters for each of the modules and the graph as a whole, wherein the pipe is a connected group of multiple ones of the modules, including a plurality of the restructuring modules, and for assigning one of the memory managers to the pipe.

58. (Amended) The system of claim 57 further comprising a common memory area for storing the composite frames.

59. (Amended) The system of claim 58 where the subframes are allocated within the composite frames in the common memory area.

68. (Amended) The system of claim 67 where the control manager issues a control transaction to one of the restructuring modules for initiating processing of a subframe therein only when all of the subframes processed by that module become available.

69. (Amended) A computer system for processing streaming data, comprising:

a plurality of modules [disposed in a pipe] for processing the streaming data, at least some of the modules being restructuring;

a plurality of memory managers for allocating composite frames containing subframes for containing streaming data, different ones of the subframes being associated with different ones of the modules;

a flow manager for constructing a graph as a sequence of the modules for accepting and processing the streaming data to achieve desired output data, for dividing the graph to define a pipe according to performance parameters for each of the modules and the graph as a whole, wherein the pipe is a connected group of multiple ones of the modules, including a plurality of the restructuring modules, and for assigning one of the memory managers to the pipe; and

a control manager for issuing control transactions for initiating processing operations in the modules.

77. (Amended) The system of claim 69 further comprising a common memory area for storing the composite frames.

78. (Amended) The system of claim 77 where [the]a processor [implementing]implements one or more of the restructuring modules.

80. (Amended) A computer readable medium bearing instructions and data for causing a digital computer to execute a method for processing frames of streaming data through modules in a digital computer, the method comprising:

constructing a graph as a sequence of the modules for accepting and processing the frames of streaming data to achieve desired output data;

dividing the graph to define a pipe according to performance parameters for each of the modules and the graph as a whole, wherein the pipe is [constructing a pipe as] a connected group of multiple ones of the modules, at least one of the modules being restructuring;

providing a common memory area accessible to the modules within the pipe for storing streaming data;

allocating composite frames in the common memory area, each composite frame having predefined subframes;

transporting the streaming data through different ones of the modules in the group in different ones of the subframes; and

restructuring the data among at least some of the subframes in the restructuring module.

81. (Amended) A computer readable medium bearing instructions and data for causing a digital computer to execute a method for processing frames of streaming data through multiple modules disposed in a pipe[including at least one restructuring module] in a digital computer, the method comprising:

constructing a graph as a sequence of the modules for accepting and processing the frames of streaming data to achieve desired output data;

dividing the graph to define the pipe according to performance parameters for each of the modules and the graph as a whole, wherein the pipe is a connected group of multiple ones of the modules, at least one of the modules being a restructuring module;

allocating a composite frame having multiple subframes;

performing operations upon the subframes in any of the modules sourcing data to the restructuring module;

after completion of the operations for all of the subframes sourcing data to the restructuring module, issuing a control transaction to the restructuring module; and

performing operations upon the subframes sourced to the restructuring module in response to the control transaction.